The significant chemicals of living tissue are rickety and unstable, which is exactly what is needed for life.
Isaac Asimov

ENVIRONMENTAL MEDICINE

UV Intensity May Affect Autoimmune Disorder

Ultraviolet (UV) light has long been associated with hazards including eye damage, sunburn, and skin cancer. Now there is evidence of a new risk: a report in the August 2003 issue of *Arthritis & Rheumatism* suggests that the surface intensity of UV radiation may affect the clinical and immunologic expression of myositis, an autoimmune disease that causes chronic muscle inflammation and weakness and afflicts about 30,000 Americans.

"Over the past two decades, as I've traveled around the world visiting myositis centers, I've noticed dramatic differences in how myositis presents and have wondered if this could be due to differences in environmental factors in these locations," says principal investigator Frederick W. Miller, chief of the NIEHS Environmental Autoimmunity Group.

He and other researchers had observed that patients with dermatomyositis (DM), a form of myositis involving both muscle and skin inflammation, often had anecdotally reported unusually high prior UV exposure through activities ranging from agricultural work to tanning in salons. (Researchers also knew that DM worsens with sun exposure.) However, such exposure was seldom reported by patients with polymyositis (PM), another form in which multiple muscles are inflamed. Meanwhile, years of analyzing weather data had piqued the curiosity of Miller's colleague Betsy Weatherhead, an atmospheric scientist at the University of Colorado Cooperative Institute for Research in Environmental Sciences in Boulder. She suspected that UV light may somehow play a role in the disease.

Miller's group studied patients at myositis referral centers in 15 locations around the globe, including Stockholm, Montréal, Guatemala City, and New Delhi. They also evaluated 13 geoclimatic variables that may modulate disease, including surface UV intensity, temperature, elevation, longitude, and latitude. UV radiation intensity, they conjectured, might predict the proportion of patients afflicted with DM in a given locale. Other weather factors could play a role, as well. Weather features, Miller points out, are highly interrelated: latitude is one determinant of the amount of UV light present, which, in turn, affects temperature.

Another side effect of sun? New data show a strong positive correlation between an area's UV surface intensity and prevalence of the autoimmune disease dermatomyositis.

The group analyzed clinical data and, where possible, blood samples from 919 DM and PM patients. As hypothesized, statistical analyses of weather and patient data spanning more than 10 years revealed a very strong positive correlation between UV intensity and the proportion of DM patients at a given referral center. In fact, their results reveal the strongest correlation ever shown between UV light and any human disease. Among the 15 locales studied, the lowest proportion of myositis patients with DM was found in Glasgow, Scotland (26.7%), and the highest was found in Guatemala City (83.3%). Using the study's data, Miller suspects, one could go many places in the world and use UV level data to predict the proportion of DM patients in a given myositis population.

The study does have its limitations, Miller says. It was impossible within the boundaries of this study to account for individual variables that might influence sun exposure (for example, occupation, hobbies, travel, or use of protective measures such as sunscreen) or to study environmental exposures besides UV radiation that might be important. The team was also unable to track the movement of individuals into and out locales with different UV levels, and thus verify their total exposure to UV. This could have altered the correlations that were found.

The research team excluded the role of ethnogeographic variations of known genetic risk factors for myositis and associated Mi2 antibodies as likely causes for the research findings. "The overall implication is that UV light may alter the immune system or target cells, transiently changing the expression of the genes so that different proteins [are] expressed in different amounts or in different locations," Miller explains. "Or it could involve a permanent genetic change in those cells."

This raises the interesting possibility that autoimmune disorders such as myositis may manifest themselves differently around the world due to differing gene–environment interactions. Furthermore, UV radiation may not be entirely bad: a recent study in Australia found type 1 diabetes mellitus (another immune-related disorder) to be more prevalent as latitude increased and ambient UV radiation levels decreased, a discovery that hints at another possible effect of UV radiation, this one beneficial. **–Jennifer Medlin**

Photodisc

Trade

Not-So-Free Trade

The U.S.–Chile Free Trade Agreement signed by representatives of the two countries on June 6 and passed by the U.S. House of Representatives on July 23 has been hailed by supporters as the first trade pact to integrate trade and environmental goals. But opponents contend that the agreement's environmental provisions are a retreat even from those of the North American Free Trade Agreement (NAFTA)—which many experts hold to be questionable at best—and bode poorly for future regional trade deals for which the Chilean pact may provide a model.

Members of an advisory committee of the U.S. Trade Representative reported with some satisfaction in February that the integration of environmental goals into a free trade agreement was a "singular achievement" that would incorporate environmental considerations into trade negotiations. "Trade opens markets, creates business and employment opportunities, and can increase economic growth," the Trade and Environmental Policy Advisory Committee reported. "This can lead to increased wealth, which provides opportunities to enhance environmental protection, including the creation of a political will in favor of such protection."

But critics claim that the opposite—a weakened set of environmental safeguards—may result. "The only truly enforceable environmental requirement [of the pact] is that Chile effectively enforce its [current] laws," says David Waskow, an international policy analyst and trade policy coordinator for Friends of the Earth, an international pro-environment advocacy network. "It doesn't require them to improve them in any way. It doesn't even require them not to lower them."

Waskow says his organization is concerned about the broad impact of the U.S.–Chile agreement because "Chile has some of the most sensitive and vulnerable and important forests in the world. Increased trade could lead to increased trade in forest products, and I think there's a lot of concern that Chile isn't doing an effective enough job at protecting its forests."

Chris Slevin, press secretary of the Washington, D.C.–based public interest organization Public Citizen, assesses Chilean environmental laws as not strong to begin with, and agrees with Waskow that there are no assurances that Chile won't weaken its own laws. "It's no secret that countries have dropped standards in order to attract investment," Slevin says, "and this agreement with Chile moves in that direction."

Another aspect of the U.S.–Chile pact that troubles environmentalists is its section called Chapter 10, which refers to "investor protection" for shareholders in companies that do business in Chile as part of the pact. The investor protection provisions, similar to those in NAFTA, provide foreign corporations the right to sue for damages in trade tribunals if a federal, state, or local law impedes or diminishes the company's chance to make a profit.

As NAFTA has demonstrated, companies do take advantage of such provisions. In 2000, an international NAFTA tribunal ordered the Mexican government to pay the U.S. waste disposal company Metalclad $16.7 million because the state of San Luis Potosí had refused permission to operate a waste disposal facility the company had built there. The state governor had ordered the site closed following a geological study which found that the operation would pollute the local water supply. This prompted Metalclad to charge that the governor's action was an act of expropriation.

Although it's impossible to know how that matter would have turned out had it involved an American governmental defendant and an American court, Waskow is confident that the procedure would have been different; a plaintiff like Metalclad would have a tougher time winning a case like that if it were a U.S. matter. "Under U.S. law, there would be a quite complicated analysis that would have to be done," he says, "but that wasn't done by the tribunal."

The aspect of the U.S.–Chile pact that makes environmentalists even more nervous is its apparent consideration by the U.S. Trade Representative (which declined to comment for this article) as a model for the Free Trade Area of the Americas (FTAA), a much larger geographical zone comprising the 34 democracies in North, South, and Central America and the Caribbean. "Some people on Capitol Hill are saying the Chile agreement is a model for the FTAA as if that is a good thing," Slevin says. "Chile's a relatively small country, and its impact on the U.S. economy won't be substantial. But if the labor and environment provisions in FTAA are like what they are in [the Chile agreement], it will make for more difficult passage when you're talking thirty-four countries in a proposed FTAA." **–Richard Dahl**

Top to bottom: Photodisc; Art Explosion, Chris Reuther/EHP; Photodisc

The ABCs of IPM

To help Pennsylvania public school teachers meet new requirements that they incorporate the topic of integrated pest management (IPM) into environment and ecology lesson plans, the state's IPM Program is providing teachers with training through a workshop, book, field kit, and handouts. IPM combines a variety of physical, biological, and chemical methods to control animal and plant pest species in an environmentally sustainable manner.

Program education specialist Lyn Garling says the goal is to provide basic information on IPM topics such as pest identification and biology, in addition to models of indoor and outdoor activities that can demonstrate real-world pest management skills.

EU Fights Workplace Hazards

On 13 May 2003, the European Agency for Safety and Health at Work launched an initiative to help educate managers and workers about hazardous material safety. The initiative's centerpiece will be the European Week on Safety and Health at Work, which will take place across the continent in October with the theme "Dangerous Substances—Handle with Care."

Around 37 million EU workers, from hairdressers to hospital staff, are affected by hazardous substances in their workplaces that can affect their health. Each year, occupationally related skin diseases and asthma combined cost the EU as much as € 1.4 billion (nearly US$1.6 billion), and occupational diseases in all resulted in 350 million lost work days in Europe in 1999.

Sustainable Java Gets a Jolt

Coffee, grown by an estimated 25 million farmers around the world, is the world's second most widely traded commodity after oil. In May 2003, two major coffee trading companies, Neumann Kaffee Gruppe and Volcafe Group, signed agreements with the Rainforest Alliance to promote sustainability throughout their supply networks. This will mean better working and living conditions for workers and use of farming practices that require less chemicals and support biodiversity.

Volcafe, with subsidiaries in 16 countries, is working to certify several of its farms and mills under alliance standards and is sponsoring coffee farm reforestation projects in Costa Rica and Ethiopia. Neumann is developing sustainable coffee farming guidelines that it can apply at its operations in Africa and South America.

AIR POLLUTION

Embarking on Better Health

The winds of change are blowing in Mexico City; the prospects for reducing the city's traffic congestion and air pollution—which ranks among the worst in the world, with particulate concentrations running at about double the World Health Organization's recommendations—may have improved slightly this year.

The change has been catalyzed by EMBARQ, also known as the World Resources Institute (WRI) Center for Transport and the Environment. EMBARQ is a name coined by the program's partners—the London-based Shell Foundation, which provided the seed capital to launch EMBARQ, and the Washington, D.C.–based WRI, which independently directs and manages the work. EMBARQ's goal is to help policy makers develop and implement sustainable urban transportation strategies. EMBARQ chose Mexico City as its first project in part because the city had "an empowered decision maker who wants our help," says center codirector Nancy Kete.

At EMBARQ's advice, instead of just building more roads to relieve the city's notorious congestion, Mexico City officials will develop a "bus rapid transit" system. These systems combine aspects of traditional bus and light rail systems, such as dedicated corridors, bus priority at traffic signals, and clean, comfortable vehicles. The buses will offer the latest in clean-burning technology, based on local testing of several fuels and engine types. The city also is crafting a major retrofit program to reduce emissions from existing bus and truck engines, along with a program to increase pedestrian and bicycle traffic.

Whether the approach helps reduce air pollution remains to be seen. Many other issues—such as land use planning, car and truck management, emissions reduction, and intergovernmental cooperation—must be addressed concurrently (some efforts are under way). And the city's high-altitude setting in a hemmed-in mountain basin means stagnant air will always be an obstacle.

But EMBARQ's push has set the wheels in motion for a city test of bus rapid transit, with the first corridors expected to be operating by the end of 2004. Five-year funding for the Mexico City project is expected to reach about $13 million, Kete says, with major cash contributions from the Shell Foundation, the World Bank, and The William and Flora Hewlett Foundation, and large in-kind contributions from the city and bus and fuel manufacturers.

As EMBARQ phases out of its Mexico City role in a few years and leaves the work in the hands of the local Center for Sustainable Transport that it helped establish in mid-2002, it plans to move on to other cities. It is negotiating with Shanghai, another huge city facing different challenges, and hopes to then take on a "small" city—maybe around 1 million people—possibly in India, Indonesia, or South America. **–Bob Weinhold**

POLICY

Mosquito Mismanagement?

Bangladesh is at war with mosquitoes, and the mosquitoes are winning. Since 2000, public health officials in Bangladesh say nearly 160,000 people have contracted malaria and dengue fever carried by the *Aedes aegypti* mosquito. The mosquito problem is particularly acute in the densely populated capital city of Dhaka, and the Dhaka city hall, known as the Dhaka City Corporation (DCC), has faced intense criticism for its inability to control the mosquito problem.

Qamar Banu, an entomologist at Chittagong University, says dengue fever has been a threat for several years, but with continued government inaction and mismanagement, the problem is getting worse. "The city government isn't doing what needs to be done to control the mosquito population," she says. Manjur A. Chowdhury, an entomologist and CEO of Safeway Pest Control in Dhaka, further says, "The authorities have had no effective plan of action."

Bangladeshi entomologists have long advocated an integrated approach to the country's mosquito problem. As Chowdhury explains, "The integrated approach would be part of a national plan involving changing the environment in which the mosquito breeds, while educating the public through an aggressive media education campaign that they can play an important role in controlling the mosquito population."

In contrast, critics say the DCC has failed to clean up nearly 2,400 acres of water bodies, including derelict ponds, polluted canals, and stagnant drains, that serve as a safe haven for mosquito breeding. Last November, the city terminated its *Aedes* Mosquito Surveillance Project with no explanation. This program was playing a vital role in detecting problem breeding sites in Dhaka. And the public has not been made aware of how their habits—such as keeping open containers of water and allowing water to pool in discarded tires—creates mosquito breeding grounds, says Sadia Ahmad, an entomologist at Jahangirnagar University.

The bane of Bangladesh. Government attempts to deal with disease-carrying mosquitoes have been criticized as ill-conceived and inappropriate.

Last March, Dhaka's mayor announced that the city would launch an aerial insecticide spraying program involving the use of just over US$327,000 worth of insecticide and covering 360 square kilometers within the Dhaka city limit. Scientists and health officials said the program would endanger public health with widespread pesticide exposures while increasing the pollution of Dhaka's air, already considered among the worst in Asia. Entomologist Touhid Uddin Ahmed, the now-retired principal scientific officer of the Bangladesh Institute of Epidemiology, Disease Control, and Research, points out, "Most importantly, the aerial spraying would not reach most of the mosquito breeding sites inside the city." He adds, "No country that I'm aware of uses aerial spraying as a regular management tool for mosquito control."

Under intense pressure, the city suspended its aerial spraying program in April and announced it will privatize its mosquito control program in phases. Private companies will run mosquito control programs in 90 city wards, and they can use the city's spray workers and equipment. Many feel these companies will outperform the DCC. "Solving the mosquito problem isn't going to be easy, but it can better be done through the private sector," says Chowdhury, whose company has tendered a bid. **–Ron Chepesiuk**

Digital Vision

ehpnet

American Thyroid Association

The thyroid plays an important role in human health, regulating metabolism, body temperature, growth and development, and organ functions including heart rate and blood pressure. Thyroid disorders affect an estimated 200 million people worldwide, with women affected eight times more than men. Recent studies suggest that even more people may be affected because of undiagnosed or misdiagnosed thyroid problems.

The American Thyroid Association (ATA), based in Falls Church, Virginia, is a professional society that promotes research, public awareness, and improved diagnosis, treatment, and policy for thyroid diseases. The ATA has created its website, located at **http://www.thyroid.org/**, to educate researchers, health care providers, and the general public about its work.

The site's homepage features information on upcoming meetings (including the group's 75th annual meeting in October), workshops, and accreditation courses, both in the United States and abroad. To help practitioners, researchers, and patients stay abreast of new developments, the site offers recent news items and ATA press releases on subjects including advances in thyroid treatment and announcements from such organizations as the National Academy of Sciences and the American Academy of Pediatrics.

AMERICAN THYROID ASSOCIATION
FOUNDED 1923

In the Professionals section of the site is a listing of *International Classification of Diseases, Ninth Revision* codes that the ATA has recommended to Medicare for laboratory testing for thyroid dysfunction, as well as National Academy of Clinical Biochemistry guidelines developed to help clinicians better diagnose these problems. These guidelines present preanalytic factors that must be taken into account when a patient presents with abnormal levels of thyroid hormones and an in-depth overview of the laboratory tests used in this field.

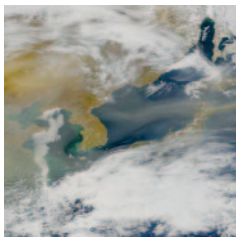
The section's Other Sites of Professional Interest link has information on patient support organizations, educational materials, international thyroid and endocrinology societies, and pharmaceutical companies that develop and sell medications for thyroid treatment. The Potassium Iodide Information link yields resources related to the recommendation of the American Academy of Pediatrics that parents, schools, and child care centers within 10 miles of a nuclear power plant have ready access to potassium iodide tablets, which can protect children against thyroid cancer in the event of radiation exposure.

Visitors can access the ATA's three official publications through the ATA Publications link on the Professionals page. Published three times each year, *Clinical Thyroidology* summarizes and comments on recently released thyroid research from journals around the world, and is available free of charge in PDF format. The ATA's monthly peer-reviewed research journal, *Thyroid*, and its newsletter, *Signal*, are available on the members-only portion of the website.

The Public & Patients section of the ATA website is provided for laypeople wanting to learn more about thyroid-related health conditions. Located here are resources on potassium iodide, frequently asked questions on the most common thyroid diseases, more detailed brochures and booklets (available as PDFs), and a listing of books of interest. Links to patient support organizations also are available here, and patients can follow the Find a Specialist link to access a clickable U.S. map and a pull-down list of other countries. **–Erin E. Dooley**

Well-Traveled Dust

In March 2003, U.S. and French scientists reported in *Geophysical Research Letters* that dust from China's Takla Makan Desert had been found in the French Alps. Dust originating in China has touched down in North America and Greenland, but this work is the first evidence that such plumes have reached Europe. Global dust storms can transport pollutants and pathogens, and contribute to global warming. The scientists confirmed the dust's origin by analyzing its mineral and isotope makeup, and used computer-based models and data from NASA's Earth Observing System Data Assimilation System to show it had traveled more than 20,000 km during the period 25 February–7 March 1990. Much of this traveling dust has been attributed to widespread desertification in Mongolia and northwestern China.



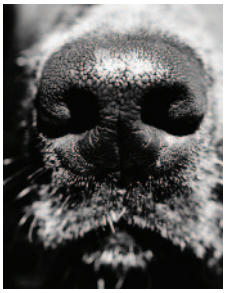
North America Cans Chlordane

On 26 June 2003, the three North American environmental agencies announced that, through efforts coordinated by the North American Commission on Environmental Cooperation (NACEC), chlordane production and use has been eliminated continentwide. Once used on crops and lawns and in furniture factories to kill termites, chlordane is a persistent organic pollutant and has been classified by the U.S. EPA as a probable human carcinogen.

Following U.S. and Canadian chlordane bans in 1995, NACEC and EPA scientists worked with Mexico's National Institute of Ecology to develop and promote cost-effective methods for testing and monitoring chlordane use in Mexico and to educate farmers and furniture makers on viable alternatives. Mexico's ban was complete in December 1998; officials held this announcement until studies confirmed that chlordane use had ended in Mexico.

Mold's Worst Friend

Europeans have long used dogs to sniff out indoor mold, which has been associated with hypersensitivity pneumonitis, rhinitis, conjunctivitis, and asthma. Now, a New Jersey mold detection and removal company, Lab Results, is offering the services of its certified Mold Dog® free of charge, for a limited time, to elementary schools in surrounding metropolitan areas.



Currently there are 30 Mold Dogs in the United States. The dogs complete 800–1,000 hours of training and can detect as many as 18 different types of mold. Dogs can detect indoor mold more precisely and quickly than other methods, at a fraction of the price—about $5,000 for a five-room house.

Top to bottom: NASA; ATA; Digital Vision